L Number	Hits	Search Text	DB	Time stamp
1	547	(anisotropic adj conduct$3) same connector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 16:54
2	284	1.ti,ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 17:47
3	19	microcrystal$5 same connector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 19:29
4	4526	(pin$1 or spindle$1 or fiber$1) same (copper or aluminum) same conductor$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:23
5	608	connector$1 same ((pin$1 or spindle$1 or fiber$1) same (copper or aluminum) same conductor$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 19:30
6	53	5.ti,ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 19:31
7	110	(ic or semiconductor$1 or chip$1 or substrate$1) same (connector$1 same ((pin$1 or spindle$1 or fiber$1) same (copper or aluminum) same conductor$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:17
8	13	5.ti,ab. and ((ic or semiconductor$1 or chip$1 or substrate$1) same (connector$1 same ((pin$1 or spindle$1 or fiber$1) same (copper or aluminum) same conductor$1)))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 19:46
9	662	rubber adj connector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:18
10	309	(ic or semiconductor$1 or chip$1 or substrate$1) same blob$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:50
11	3	((ic or semiconductor$1 or chip$1 or substrate$1) same blob$1) same connector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:21
12	68	10.ti,ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:41
13	88	crystal$1 same ((anisotropic adj conduct$3) same connector$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:42
14	14	(crystal$1 near5 conduct$4) same ((anisotropic adj conduct$3) same connector$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:45

15	1	(crystal$1 near5 conduct$4) same (microcrystal$5 same connector$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:49
16	194	conducting adj crystal$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:59
17	0	(conducting adj crystal$1) and ((ic or semiconductor$1 or chip$1 or substrate$1) same (connector$1 same ((pin$1 or spindle$1 or fiber$1) same (copper or aluminum) same conductor$1)))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:50
18	0	(conducting adj crystal$1) and ((ic or semiconductor$1 or chip$1 or substrate$1) same blob$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 20:50
19	54	(ic or semiconductor$1 or chip$1 or substrate$1) same (conducting adj crystal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:41
20	165	conductive adj crystal$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 21:13
21	56	(ic or semiconductor$1 or chip$1 or substrate$1) same (conductive adj crystal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 21:00
22	57	electric$6 near5 ((conducting adj crystal$1) or (conductive adj crystal$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:41
23	2	5329423.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:22
24	100157	(pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:23
25	0	(rubber adj connector$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:24
26	1	((anisotropic adj conduct$3) same connector$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:39
27	8	(resilient adj sheet$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:42
28	11827	(ic or semiconductor$1 or chip$1 or substrate$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:41

29	1506	electric$6 same ((ic or semiconductor$1 or chip$1 or substrate$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1)))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:42
30	0	(resilient adj sheet$1) and (electric$6 same ((ic or semiconductor$1 or chip$1 or substrate$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:43
31	601	sheet$1 and (electric$6 same ((ic or semiconductor$1 or chip$1 or substrate$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:43
32	198	sheet$1 same (electric$6 same ((ic or semiconductor$1 or chip$1 or substrate$1) same ((pin$1 or spindle$1 or fiber$1 or needle$1) same (polymer$1))))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:59
33	25	32.ti,ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/02/03 22:59

US-PAT-NO: 5348762

DOCUMENT-IDENTIFIER: US 5348762 A

TITLE: Process for the production of conductive layers

DATE-ISSUED: September 20, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hofherr; Walther	Kirchzarten	N/A	N/A	DE
Minder; Ernst	Sissach	N/A	N/A	CH
Hilti; Bruno	Basle	N/A	N/A	CH
Ansermet; Jean-Philippe	Morges	N/A	N/A	CH

US-CL-CURRENT: 427/121, 252/519.1 , 427/126.1 , 427/126.2 , 427/388.1 , 427/389.7 , 427/393.5 , 427/393.6

ABSTRACT:

A process for the production of a conductive layer on a substrate, said conductive layer comprising a network of crystal needles of conductive radical cation salts based on tetrathiotetracenes, tetraselenotetracenes or tetratellurotetracenes and chlorine, bromine, iodine or copper dichloride, and said network is embedded in a polymer matrix, by coating at least one side of said substrate with a) a suspension of crystal needles of the radical cation salts of formula I in an inch solvent which may additionally contain a thermoplastic polymer or at least one starting compound for a thermosetting polymer, or b) a solution (b1) of a tetrathiotetracene, tetraselenotetracene or tetratellurotetracene, (b2) of a monomeric, oligomeric or polymeric organic compound which contains chlorine, bromine or iodone and, when heated with these tetracenes, forms a radical cation salt, or of anhydrous CuCl.sub.2, a CuCl.sub.2 aquo complex or a CuCl.sub.2 solvent complex, and (C3) of a thermoplastic polymer or at least one starting compound for a thermosetting polymer, in an inert solvent, and subsequently evaporating the solvent, which process comprises applying said layer by spraying the suspension a) or solution b) from nozzles on to the substrate. Very fine meshed, dense and isotropic crystal needle networks are obtained. The coatings exhibit rapid surface discharges and are suitable for use as electostatic coatings or, on account of their good electrical conductivities, as electrode material for display elements.

20 Claims, 0 Drawing figures

Exemplary Claim Number: 1

---------- KWIC ---------

Detailed Description Text - DETX (15):

44.18 mg of tetraselenotetracene and 3 g of a polyether of a diglycidyl ether of bisphenol A and bisphenol A are dissolved at 150.degree. C. in 48 g of N-methylpyrrolidone (NMP). After about 45 minutes, 400 .mu.l of a solution of NMP containing 1% of trimethylammonium hydrochloride and 2% of water are added, followed by the addition of 300 .mu.l of a solution of H.sub.2 O.sub.2 in NMP/water (9:1). The mixture is sprayed on to a glass plate (spray conditions: (two-fluid steel nozzle, propellant gas argon, distance of nozzle

from glassplate c. 20 cm, spraying rate 4 cm/s). The solvent is evaporated at 100.degree. C. to leave a 5 .mu.m layer containing a dense needle network of conductive crystal needles of (tetraselenotetracene).sub.2 Cl in a polyether matrix. The conductivity is 1 S/cm. The layer bonds excellently to the glass substrate.

US-PAT-NO: 5911583

DOCUMENT-IDENTIFIER: US 5911583 A

TITLE: Stacked electrical circuit having an improved interconnect and alignment system

DATE-ISSUED: June 15, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Roybal; Ty J.	Tucson	AZ	N/A	N/A
Stegura; Stephen R.	Tucson	AZ	N/A	N/A
Drake; Peter J.	Vail	AZ	N/A	N/A

US-CL-CURRENT: 439/66, 439/70

ABSTRACT:

A three-dimensional stacked electrical circuit assembly that uses spherical or cylindrical metallic contacts that are surface mounted to input and output pads of circuit substrates that contact recessed wire button contacts disposed in cavities formed in a nonmetallic spacer disposed between the substrates. Each metallic contact fits into a through hole in the spacer and makes contact with a separate wire button contact in the through hole of the spacer. The metallic contacts are recessed within the spacer and are protected from contamination and handling damage. Back-to-back spacers may be employed that use plungers to make contact between wire button contacts disposed therein. The wire button contacts are recessed in the through holes, which provides for an interconnect system having low contact resistance, high current capacity, low contact force, and the ability to customize the shape of the spacer. The present invention aligns stacked circuit assemblies and eliminates the need for through holes, maximizes internal routing area, and reduces cost.

15 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

---------- KWIC ---------

Detailed Description Text - DETX (3):

FIG. 2 shows a second portion of the three-dimensional stacked interconnect circuit assembly 10 comprising a nonmetallic spacer 15 containing recessed **wire button** contacts 17 in accordance with the present invention. The **wire button** contacts 17 are available from connector manufacturers, such as Cinch Connector Division and Technic, for example. The nonmetallic spacer 15 may be made of a material such as plastic **polymer,** for example, or other suitable nonmetallic material. There are no particular limitations regarding the material from which the nonmetallic spacer 15 is made.

US-PAT-NO: 4268956

DOCUMENT-IDENTIFIER: US 4268956 A

TITLE: Method of fabricating an interconnection cable

DATE-ISSUED: May 26, 1981

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Parks; Howard L.	Woodland Hills	CA	N/A	N/A
Kuronen; John M.	Camarillo	CA	N/A	N/A

US-CL-CURRENT: 29/869, 29/828 , 29/846 , 29/872

ABSTRACT:

A flexible connector cable for providing high density and reliable electrical interconnections between printed circuit **boards** or any other surfaces having conductive paths that need connection to conductive paths on adjacent surfaces. The connector cable comprises a flat flexible laminar structure including an electrically-insulative layer and an electrically-conductive layer. The **insulative** layer is typically formed on a bonded **plastic** such as Polyimide and the conductive layer is typically formed of copper. Openings are formed in the insulative layer to expose the conductive layer and raised contacts or **buttons** are deposited on the conductive layer on both surfaces of the cable. The raised contacts are formed of ductile conductive material which exhibits plastic deformation under pressure to form good electrical connections.

2 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

---------- KWIC ---------

Abstract Text - ABTX (1):

A flexible connector cable for providing high density and reliable electrical interconnections between printed circuit **boards** or any other surfaces having conductive paths that need connection to conductive paths on adjacent surfaces. The connector cable comprises a flat flexible laminar structure including an electrically-insulative layer and an electrically-conductive layer. The **insulative** layer is typically formed on a bonded **plastic** such as Polyimide and the conductive layer is typically formed of copper. Openings are formed in the insulative layer to expose the conductive layer and raised contacts or **buttons** are deposited on the conductive layer on both surfaces of the cable. The raised contacts are formed of ductile conductive material which exhibits plastic deformation under pressure to form good electrical connections.

DERWENT-ACC-NO: 1997-004275

DERWENT-WEEK: 199948

TITLE: Dendrite for soldering material of electronic package - has coating material layered on surface of dendrite under which projects filament

INVENTOR: KANG, S K; PURUSHOTHAMAN, S ; WALKER, G F

PATENT-ASSIGNEE: IBM CORP[IBMC] , INT BUSINESS MACHINES CORP[IBMC]

PRIORITY-DATA: 1995US-0414070 (March 31, 1995)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 08273431 A	October 18, 1996	N/A	008	H01B 001/00
US 5958590 A	September 28, 1999	N/A	000	B32B 005/16

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 08273431A	N/A	1996JP-0087199	March 15, 1996
US 5958590A	N/A	1995US-0414070	March 31, 1995

INT-CL (IPC): B32B005/16, H01B001/00 , H05K001/14

ABSTRACTED-PUB-NO: JP 08273431A

BASIC-ABSTRACT:

The dendrite is formed at a centre when a soldering material is applied on a specific surface e.g. a printed circuit board. A filament projects from under the dendrite on whose surface a coating material is layered.

ADVANTAGE - Utilises electrically conductive crystal grains as coating material of dendrite.

ABSTRACTED-PUB-NO: US 5958590A

EQUIVALENT-ABSTRACTS:

The dendrite is formed at a centre when a soldering material is applied on a specific surface e.g. a printed circuit board. A filament projects from under the dendrite on whose surface a coating material is layered.

ADVANTAGE - Utilises electrically conductive crystal grains as coating material of dendrite.

TITLE-TERMS: DENDRITE SOLDER MATERIAL ELECTRONIC PACKAGE COATING MATERIAL LAYER SURFACE DENDRITE PROJECT FILAMENT

ADDL-INDEXING-TERMS:
PCB

DERWENT-CLASS: P73 V04 X12 X24

DERWENT-ACC-NO: 1995-037411

DERWENT-WEEK: 200024

TITLE: Plastics semiconductor casing without electric wires - has several signal transmitting terminals protruding from semiconductor chip

INVENTOR: CHA, G B; SONG, C J ; CHA, K ; YUN, C

PATENT-ASSIGNEE: GOLDSTAR ELECTRON CO LTD[GLDS] , KINSEI ELECTRON KK[KINSN], LG SEMICONDUCTOR CO LTD[GLDS]

PRIORITY-DATA: 1993KR-0011506 (June 23, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES
DE 4421077 A1 H01L 023/50	January 5, 1995	N/A	006
KR 152901 B1 H01L 023/28	October 1, 1998	N/A	000
JP 07022474 A H01L 021/60	January 24, 1995	N/A	005
US 5444301 A H01L 023/48	August 22, 1995	N/A	006

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
DE 4421077A1	N/A	1994DE-4421077	June 16, 1994
KR 152901B1	N/A	1993KR-0011506	June 23, 1993
JP 07022474A	N/A	1994JP-0139812	June 22, 1994
US 5444301A	N/A	1994US-0260571	June 16, 1994

INT-CL (IPC): H01L021/60, H01L023/28 , H01L023/48 , H01L023/50 , H01L029/44 , H01L029/52 , H01L029/60

good more than one example of blobs & bumps

ABSTRACTED-PUB-NO: DE 4421077A

BASIC-ABSTRACT:

Instead of chip connecting wires there are several protruding signal transmitting chip (11) terminals (13). On the latter are fitted plastics strips (15, 25) of the same width as the terminals. On one side of the top face of each terminal is applied an insulating, double-sided strip (16, 26) coupling each terminal to the semiconductor chip.

Several conductive contact **blobs** (18, 28) connect each terminal to the **semiconductor chip**. A preset section, containing the **semiconductor chip** and the terminals, is embedded in a casting region (14).

ADVANTAGE - Lightweight, thin and small structure and high packing density on a circuit board, with improved electric properties.

ABSTRACTED-PUB-NO: US 5444301A

good example of conductive particles connected

US-PAT-NO: 6042894

DOCUMENT-IDENTIFIER: US 6042894 A

TITLE: Anisotropically electroconductive resin film

DATE-ISSUED: March 28, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Goto; Yasushi	Shimodate	N/A	N/A	JP
Tsukagoshi; Isao	Shimodate	N/A	N/A	JP
Ohta; Tomohisa	Tochigi-ken	N/A	N/A	JP

US-CL-CURRENT: 427/504, 427/197 , 427/198 , 427/203 , 427/204 , 427/205 , 427/498 , 427/505 , 427/510 , 427/512 , 427/516

ABSTRACT:

An isotropically electroconductive resin film material produced by sticking electroconductive particles to a sticking layer formed on a support and fixing therein, and filling a film-forming resin incompatible with the sticking material among the electroconductive particles, has electroconductivity only in the film thickness direction via the electroconductive particles uniformly dispersed in the plane direction, and is suitable for electrically connecting oppositely placed circuits and fine electrodes of a plurality of electronic parts, and for testing electronic parts.

15 Claims, 50 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

---------- KWIC ---------

Brief Summary Text - BSTX (3):

Miniaturization of electronic parts has entailed higher density and higher fineness of the circuits used therein. As the conventional solder or rubber connectors can hardly meet the connecting specifications of these fine circuits, anisotropically electroconductive adhesives or connecting means made of a film are popularly used recently. In these methods, a layer of electrical connecting means made of an insulating resin containing a specified amount of an electroconductive material is disposed between the opposing circuits and pressed, with heating if necessary, to set up electrical connection between the upper and lower circuits as well as electrical insulation between the adjoining circuits. It is also common practice to use insulating resin as an adhesive for making electrical connection between the opposing circuits and fixing thereof.

EQUIVALENT-ABSTRACTS:

The casing has several chip signal transmitting leads (13) with detachable polyimide tape (15) with the same width as the leads is attached to the lower surface of leads. Insulating double-sided adhesive polyimide tape connected to the upper surface of the lead attaches to the semiconductor chip.

The electrical connection is made by a bump (18) and (28) on the upper surface of each lead which are made of solder or gold with a height of 20-50 microns. The insulating double sided adhesive tape (16) and (26) is made from a thermosetting tape with thickness of 70-150 microns.

ADVANTAGE - Bumps enable package to be lightened, thinned, miniaturised and densely surface-mounted on PCB, reduces deterioration of package due to wire bonding.

CHOSEN-DRAWING: Dwg.1A/4 Dwg.2a/4

TITLE-TERMS: PLASTICS SEMICONDUCTOR CASING ELECTRIC WIRE SIGNAL TRANSMIT TERMINAL PROTRUDE SEMICONDUCTOR CHIP

DERWENT-CLASS: U11

EPI-CODES: U11-D01A1; U11-D03A2;

SECONDARY-ACC-NO:
Non-CPI Secondary Accession Numbers: N1995-029643

US-PAT-NO: 6365840

DOCUMENT-IDENTIFIER: US 6365840 B1

TITLE: Electrical connecting device and electrical connecting method

DATE-ISSUED: April 2, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Honda; Noriyuki	Aichi	N/A	N/A	JP
Suga; Yasuhiro	Tochigi	N/A	N/A	JP

US-CL-CURRENT: 174/259, 174/255 , 174/260 , 257/737 , 257/778 , 257/783 , 257/E21.503 , 257/E21.514 , 361/760 , 361/773 , 361/779

ABSTRACT:

The present invention provides an electrical connecting member and an electrical connecting method for achieving electrical connection securely through conductive particles regardless of a slight unevenness of an object matter. An electrical connecting device (10) for electrically connecting an electrical connecting portion (5) of a first object to an electrical connecting portion (3) of a second object comprises an adhesive layer (6) disposed on the first object (4) and constituted of a plurality of conductive particles (7) and a binder (8) containing the plurality of the conductive particles (7) and a paste (9) having a fluidity and disposed on the film-like adhesive layer (6).

11 Claims, 14 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

---------- KWIC ---------

Brief Summary Text - BSTX (7):

With recent smaller sized and decreased thickness of electronic parts, circuits for use therein have been denser and more precise, so that connection of such an electronic part to a fine electrode is difficult with conventional soldering method, **rubber connector** or the like. Therefore, adhesive agent and film material (hereinafter referred to as connecting member) having anisotropy excellent in fine pitching and conductivity have been often used.

PGPUB-DOCUMENT-NUMBER: 20010029119

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20010029119 A1

TITLE: Fine-pitch flexible electrical connector, and method for making same

PUBLICATION-DATE: October 11, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
RULE-47			
Chung, Kevin Kwong-Tai	Princeton	NJ	US

US-CL-CURRENT: 439/91

ABSTRACT:

A fine-pitch flexible electrical connector includes a plurality of generally parallel metal conductors in a matrix of a molecularly flexible dielectric adhesive, and may be made in various sizes and thicknesses so as to be utilized as a connector, jumper, test membrane, interposer or other electrical connection structure providing connection between two or more electronic devices and/or substrates. The connector is made by providing a number of metal conductors disposed in relation to the dielectric adhesive, such as by lamination or aggregation, and then separating individual connectors therefrom by cutting, slicing and/or otherwise separating transversely to the longitudinal direction of the conductors.

---------- KWIC ---------

Summary of Invention Paragraph - BSTX (3):

[0004] Typical conventional compressible connectors are made using a silicone rubber dielectric matrix having conductors therein provided by compatible silicone rubber that is filled with carbon, silver, gold or other conductive material. The use of silicone rubber for both dielectric and conductors provides for proper bonding therebetween for mechanical strength. A thickness along the direction of electrical conduction of about 1 mm (about 40 mils) is typical, and such silicone **rubber connectors** are available from several suppliers, such a ZEBRA.RTM. elastomeric connectors from Fujipoly (Internet URL www.fujipoly.com) and Z-axis Connector Company (Internet URL www.z-axiscc.com).

Summary of Invention Paragraph - BSTX (4):

[0005] Although the silicone rubber elastomeric connectors may be "ideal" for some applications, the silicone rubber presents certain drawbacks and disadvantages. For example, uncured silicone rubber, e.g., silicone molecules, may leach out or otherwise come to be disposed upon electrical contacts and contact pads, thereby to caus problems in soldering, bonding or otherwise making reliable electrical connection thereto. A further disadvantage is that mechanical fasteners and/or clamps are necessary to make electrical connection to such silicone **rubber connectors,** which increases the cost of the use thereof both with respect to the cost of the connector and of the labor necessary to utilize it, but allows replacement and rework.

PGPUB-DOCUMENT-NUMBER: 20020056505

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020056505 A1

TITLE: Electrical connecting device and electrical connecting method

PUBLICATION-DATE: May 16, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
RULE-47			
Honda, Noriyuki	Aichi		JP
Suga, Yasuhiro	Tochigi		JP

US-CL-CURRENT: 156/89.21, 156/151 , 257/E21.503 , 257/E21.514

ABSTRACT:

The present invention provides an electrical connecting member and an electrical connecting method for achieving electrical connection securely through conductive particles regardless of a slight unevenness of an object matter. An electrical connecting device (10) for electrically connecting an electrical connecting portion (5) of a first object to an electrical connecting portion (3) of a second object comprises an adhesive layer (6) disposed on the first object (4) and constituted of a plurality of conductive particles (7) and a binder (8) containing the plurality of the conductive particles (7) and a paste (9) having a fluidity and disposed on the film-like adhesive layer (6).

---------- KWIC ---------

Summary of Invention Paragraph - BSTX (5):

[0004] With recent smaller sized and decreased thickness of electronic parts, circuits for use therein have been denser and more precise, so that connection of such an electronic part to a fine electrode is difficult with conventional soldering method, **rubber connector** or the like. Therefore, adhesive agent and film material (hereinafter referred to as connecting member) having anisotropy excellent in fine pitching and conductivity have been often used.

PGPUB-DOCUMENT-NUMBER: 20020173145

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020173145 A1

TITLE: Electrical connection materials and electrical connection method

PUBLICATION-DATE: November 21, 2002

INVENTOR-INFORMATION:

NAME RULE-47	CITY	STATE	COUNTRY
Honda, Noriyuki	Kanagawa		JP
Hanai, Nobuhiro	Aichi		JP
Nakada, Masakazu	Aichi		JP

US-CL-CURRENT: 438/644, 257/E21.503 , 257/E21.514 , 438/654

ABSTRACT:

The present invention is to provide an electrical connection material through which an electrical connection via conductive particles can be performed reliably regardless of a little unevenness of an object. The electrical connection material is an electrical connection material 100 for electrically connecting an electrical connection portion of a first object 4 and an electrical connection portion of a second object 2. The electrical connection material 100 comprises a first film-like adhesive layer 6 which is a film-like adhesive layer arranged on the first object 4 and is composed of a plurality of conductive particles 7, a first binder 8 containing the conductive particles 7, and a first filler F1 and a second film-like adhesive layer 9 which is arranged on the first film-like adhesive layer 6 and is composed of a second binder 9A whose viscosity is lower than that of the first binder 8 and a second filler F2.

---------- KWIC ---------

Summary of Invention Paragraph - BSTX (5):

[0003] For the connection between an electronic component and a fine electrode, since conventional solder or a **rubber connector** or the like does not deal with such connection well, an adhesive agent or a film-like material (hereafter, referred to as a connection member) which is anisotropic, excellent in a fine pitch and has conductivity has been employed frequently.

US-PAT-NO: 5822030

DOCUMENT-IDENTIFIER: US 5822030 A

TITLE: Liquid crystal display device, its mounting structure and electronic device

DATE-ISSUED: October 13, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Uchiyama; Kenji	Suwa	N/A	N/A	JP

US-CL-CURRENT: 349/149

ABSTRACT:

Liquid crystal display device wherein, in addition to the semiconductor chip for liquid crystal drive, a liquid crystal drive circuit or all or some of the other electronic components required for the liquid crystal display control circuit are mounted on one circuit board made from regular hard substrate materials, and the output terminals of said circuit board are connected directly to the liquid crystal cell using an anisotropic conductive film or other known means. The input terminals of the circuit board are connected directly to the terminals of the main unit substrate of the electronic device wherein the liquid crystal display device is installed via a flexible cable, a rubber connector made from conductive rubber or an anisotropic conductive film, or by solder or adhesive. The liquid crystal display device can be secured in place by sandwiching it between the case of the electronic device and the main unit substrate attached to it, in which case the rubber connector between the input terminals of the circuit board and the terminals of the main unit substrate is retained in a compressed state.

26 Claims, 20 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 12

---------- KWIC ---------

Abstract Text - ABTX (1):

Liquid crystal display device wherein, in addition to the semiconductor chip for liquid crystal drive, a liquid crystal drive circuit or all or some of the other electronic components required for the liquid crystal display control circuit are mounted on one circuit board made from regular hard substrate materials, and the output terminals of said circuit board are connected directly to the liquid crystal cell using an anisotropic conductive film or other known means. The input terminals of the circuit board are connected directly to the terminals of the main unit substrate of the electronic device wherein the liquid crystal display device is installed via a flexible cable, a rubber connector made from conductive rubber or an anisotropic conductive film, or by solder or adhesive. The liquid crystal display device can be secured in place by sandwiching it between the case of the electronic device and the main unit substrate attached to it, in which case the rubber connector between the input terminals of the circuit board and the terminals of the main unit substrate is retained in a compressed state.

US-PAT-NO: 6002180

DOCUMENT-IDENTIFIER: US 6002180 A

TITLE: Multi chip module with conductive adhesive layer

DATE-ISSUED: December 14, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Akram; Salman	Boise	ID	N/A	N/A
Wood; Alan G.	Boise	ID	N/A	N/A
Farnworth; Warren M.	Nampa	ID	N/A	N/A

US-CL-CURRENT: 257/783, 257/782 , 257/E21.503 , 257/E21.511 , 257/E21.514 , 257/E23.004

ABSTRACT:

A method for forming a chip module such as a multi chip module or a memory module is provided. The multi chip module includes a substrate configured to mount a plurality of semiconductor dice thereon. The substrate includes raised contact members formed in patterns that correspond to the locations of bond pads on the dice. An anisotropic conductive adhesive layer is formed between the contact members on the substrate and the bond pads on the dice to secure the dice to the substrate and form an electrical connection therebetween. In addition, an underfill layer can be formed between the dice and substrate to fill the gap therebetween and further secure the dice to the substrate. Conductors and input/output pads formed on the substrate form electrical paths to and from the contact members. To form a memory module, one or more multi chip modules can be mounted to a supporting substrate having an edge connector in electrical communication with the conductors and with contact members on the substrates.

26 Claims, 15 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

---------- KWIC ---------

Abstract Text - ABTX (1):

A method for forming a chip module such as a multi chip module or a memory module is provided. The multi chip module includes a substrate configured to mount a plurality of semiconductor dice thereon. The substrate includes raised contact members formed in patterns that correspond to the locations of bond pads on the dice. An anisotropic conductive adhesive layer is formed between the contact members on the substrate and the bond pads on the dice to secure the dice to the substrate and form an electrical connection therebetween. In addition, an underfill layer can be formed between the dice and substrate to fill the gap therebetween and further secure the dice to the substrate. Conductors and input/output pads formed on the substrate form electrical paths to and from the contact members. To form a memory module, one or more multi chip modules can be mounted to a supporting substrate having an edge connector in electrical communication with the conductors and with contact members on the substrates.

PAT-NO: JP361004255A

DOCUMENT-IDENTIFIER: JP 61004255 A

TITLE: PACKAGE FOR INTEGRATED CIRCUIT

PUBN-DATE: January 10, 1986

INVENTOR-INFORMATION:
NAME
WATARI, TOSHIHIKO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
NEC CORP	N/A

APPL-NO: JP59124460

APPL-DATE: June 19, 1984

INT-CL (IPC): H01L023/36

US-CL-CURRENT: 99/516, 257/706 , 257/E23.09 , 257/E23.112

ABSTRACT:

PURPOSE: To improve heat conducting characteristics from an IC chip to a heat sink, by inserting heat connectors, in which heat conducting fiber is implanted in resilient sheets, between chip carriers and the heat sink under the compressed state.

CONSTITUTION: Many chip carriers 3 are connected and arranged on a wiring substrate 1 through a solder bonding part 2. Heat connectors 5, in which heat conducting fiber is implanted in resilient sheets, are inserted between the chip carriers 3 and a heat sink 4 under the state the heat conducting fiber is compressed to the degree the fiber is bent. The heat conductor 5 is formed by embedding many beryllium copper thin wires 18, which are the conducting fiber, in silicone rubber 17, which is a relatively soft insulating material. The connector form an excellent heat conducting path between a chip carrier cap 16 and the heat sink 4. Since the heat sink 4 and the chip carriers 3 are not fixed, stress of expansion and contraction due to temperature difference is not applied between the chip carriers 3 and the wiring substrate 1. Therefore, the connection of the chip carriers 3 and the wiring substrate 1 can be ensured.

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CIN::APSE® is more than a computer connector; it's a versatile technology with excellent reliability in commercial, military, and aerospace applications. ...
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... Electrical connections to the HSC are made via a flex cable and an eight-pin **cin::apse** connector [drawing number 3823.113-MB-317274]. ...
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... 2.Cold end pigtail **cin::apse** connector. The connector has eight contact pads: 8. 7. 6. 5. 1. 2. 3. ... 3.Flex cable. 4.Warm end **Cin::apse** connector. 5.Right hand Stereoboard. ...
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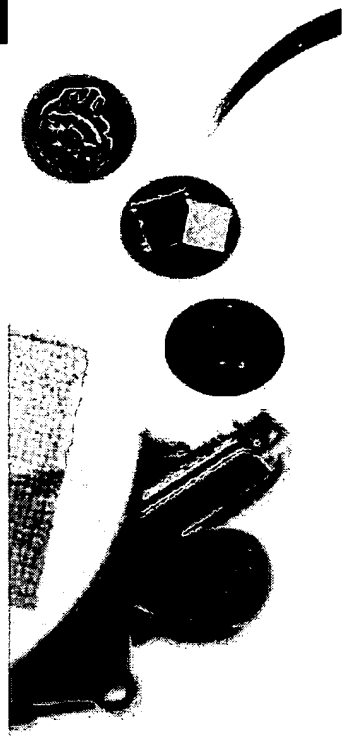


CIN::APSE TECHNICAL INFO

Here are some guidelines to follow when layingh out your PCB, flex circuit, c MCM.

Characteristics	.020" dia. button Button Only	Button / Plunger	Plunger / Button / Plunger	Button / Spacer / Button
Pad Size (min. dia.)	.030"	.030"	.020"	.030"
Minimum Center Spacing	1mm	.050"	.050"	.050"
Circuit Resistant (milli-Ohms)	10-15	30-35	45-50	40-45
Inductance (nano-Henry)	<1	<1	<2	<1
Min. Compression Force/button	2 oz.	2 oz.	2 oz.	4 oz.
Current Carrying Capacity	1-3 A	1-3 A	1-3 A	1-3 A
Contact Travel	up to .010"	up to .010"	up to .010"	up to .020"

Pad Plating: 20µin. Au over 50µin. Ni if multiple cycles are
(flash Au for single mate)
In-pad vias: < half the diameter of the button
PCB Flatness: .003 in./in.
Pad true position: <.005"

Compression System Design

As stated before, CIN::APSE® is a solderless connector technology, which re compression to make contact between components. Therefore, design of a p compression system for the connector is very important. The compression sy into account the effects of the following: PCB thickness, connector thickness spacing of buttons, and flatness of the mating surfaces.

Use the common example listed below as a base of reference for your desig

- For a .062" thick PCB mating to a .020" dia. button-only CIN::APSE® on .050" centers, you will need a locking device every 1.5 inches.
- If planarity cannot be of achieved, a stiffener plate must be attached t side of the PCB to limit substrate bow.
- The plate should be of suitable material and thickness to fit the applic

Cinch has many years of experience in designing compression systems with We can help optimize a compression system to meet your specific applicatio

Button Range*

ø Available Pitch (mm)	ø 0.4mm 0.8	ø 0.5mm 1.27	ø 1mm 2
Current carrying capacities	1A	3A	4A

Performance Characteristics *

Characteristics	Button only	Button/ Plunger	Plunger/ Button/ Plunger
Contact resistance	<15 mΩ	<35 mΩ	<50 mΩ
Inductance	<1 nH	<1 nH	<2 nH
Current carrying capacity	3A	1.5A	1A

Insulation resistance	20000 MΩ	20000 MΩ	20000 MΩ
Dielectric withstanding voltage	600V	600V	600V
Durability	25000 cycles	25000 cycles	25000 cycles
Vibration		No cut off > 20 ns @ 55 g 10/2 kHz	
Shock		No cut off > 20 ns @ 500 g/1 ms	
Temperature Range		-55 to + 200 °C (LCP insulator)	
Industrial atmosphere		4 days, H_2S, SO, 40 °C, 75% R.H.	
High frequency capability	Up to 20 GHz	Up to 2 GHz	

Technical Advice for CIN::APSE interface, application guide*

1. PCB Layout:
1.1 Alignment accuracy:

A ø 0.5 mm button requires at least a 0.84 mm ø pad
A ø 1 mm button requires at least a 1.4 mm ø pad
A plunger requires at least a 0.23 mm ø pad

1.2 Pad material:

Contact area must be gold plated. A 0.76 µm nickel is suggested if cycles are involved. For socket application or one time connections gold is sufficient.

1.3 Pitch:

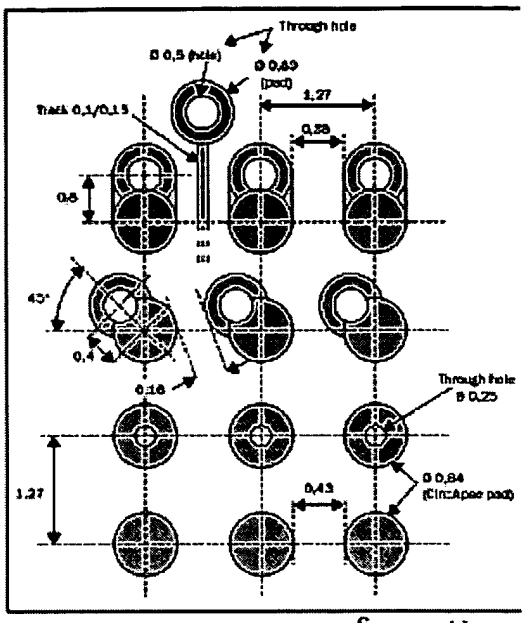
The minimum pitch between the contacts is 1mm with a ø 0.5 mm contact. Standard pitch is 1.27mm

1.4 Planarity:

- The CIN::APSE assembly force is 0.7 N to 1.7 N per position.
- The substrate should not go out of shape more than 0.1mm between
- With a 1.6mm thick PCB, a locking position is suggested at least eacl
- If the planarity cannot be acheived, a stiffner must be placed behind tl
- If the substrate is coated, the coating should not be thicker than the p under the button board.

1.5 Vias:

Through holes should generally be placed out of the contact area.



Suggested layout

2. Button board thickness:
The minimum standard is 0.79 mm
The thickness tolerance is ± 0.03 mm for a component interface and ± 0.05 r
stacking connector.

**Please, consider the above CIN::APSE performance as example and should be confirmed .*
configuration.

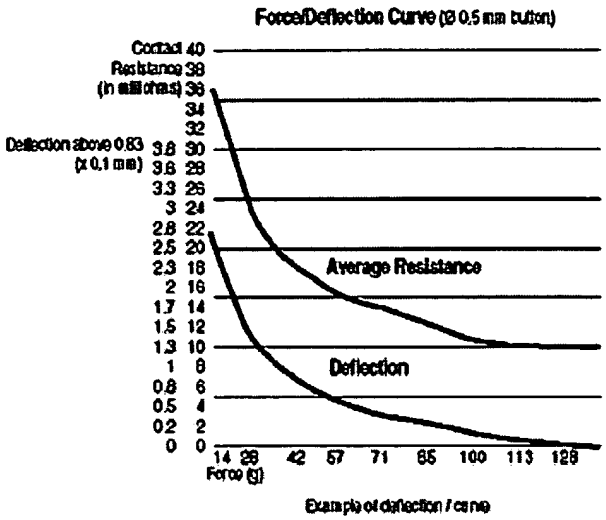
CIN::APSE TEST AND PERFORMANCE (EXTRACT)

Fully tested indepe

Test Description	Standard MIL STD 1344	Requirement	Button Only* Result	Button/Plunger* Result	Plunger/I Result
Contact Resistance Insulation Dielectric Withstanding Voltage	meth 3002.1 meth 3003.1 meth 3001.1	20mv, 100 mA U_100 Vcc 1 min Under 600Veff 1 min.	Rc<15mΩ RI>20000 MΩ U>600 V RMS	Rc<25mmΩ RI>20000 MmΩ U>600 V RMS	Rc<55mΩ RI>20000 U>600 V
Maintenance Ageing	meth.2016	25000 cycles + 96 Hours Salt spray	No significant resistance modification	No significant resistance modification	
Sinus Vibration	meth. 2005.1	Condition 3.20 G from 5 to 2000 Hz, 3 cycles of 20 min/axe	No cut off>20ns No resistance Change	No cut off>20ns No resistance Change	No cut off No resist
Random Vibration	meth. 2005.1	Condition 5. letter J. 1g/Hz 2000 Hz, 15 min/axe	No cut off>20ns No resistance Change	No cut off>20ns No resistance Change	No cut off No resist
Mechanical Shocks	meth. 2004.1	Condition C. 500 cycles 500g, 1 ms 3 shocks 6 directions	No cut off>20ns No resistance Change	No cut off>20ns No resistance Change	No cut off No resist
Thermal life	meth. 1005.1	Condition 5, 125° C 3A 1000H	Ri>16000 MΩ100VDC	Ri>16000 MΩ100VDC	Ri>16000
Salt Spray	meth. 1001.1	Condition D, 35°/5% Na C1, 96H and 1000 H	No significant Resistance Modification	No significant Resistance Modification	

*Test performed on : Button Only : 227 ways Thickness: 0.8 mm - Plunger/Button : 9 ways Thickness 2 mm - Plunger/Button/Plunger : 249 ways Thic

Force Deflection Curve



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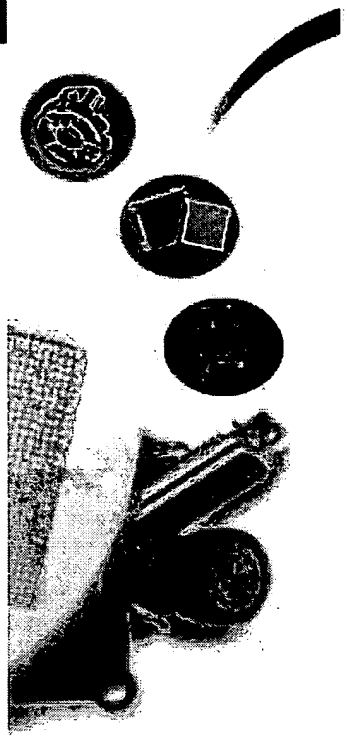


CIN::APSE APPLICATIONS

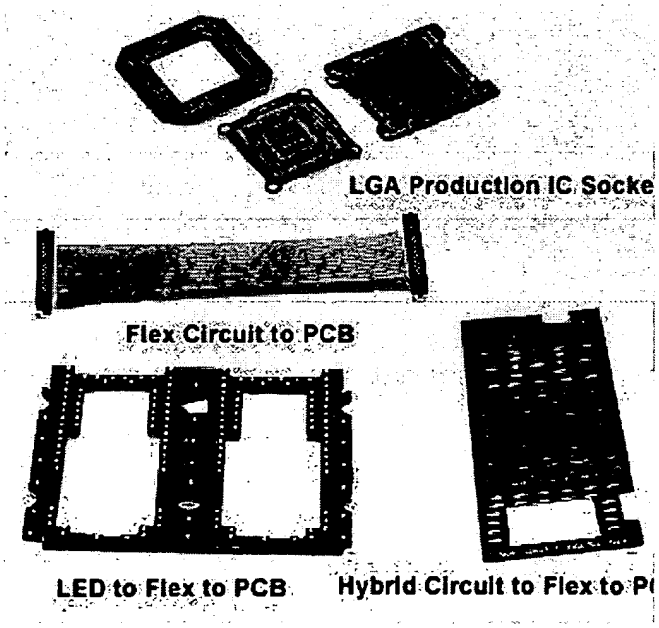
CIN::APSE® can be used in almost any application where you need a hi interconnect between two parallel surfaces. Common applications incl

- Chip Package-to-Board (commonly called LGA - Land Grid Array)
- Board-to-Board
- Flex-to-Board
- Component-to-Board

CIN::APSE® connectors are commonly used in a wide variety of markets suc

- **High End Computers**
  (Servers, Workstations, Super Computers, ATE)
- **Mil/Aero**
  (RF Antennas, missile guidance, satellites, SEM-E modules)
- **Telecommunications**
  (cell phones, portable devices, high speed RF coax, Fiber Optic Trans
- **Automotive**
  (sensors, ECU attach)

CIN::APSE® is especially well suited for high speed digital or RF applications the configuration, CIN::APSE® can handle 26 Ghz signals with less than 3db Validating independent test reports and customer written white papers are a



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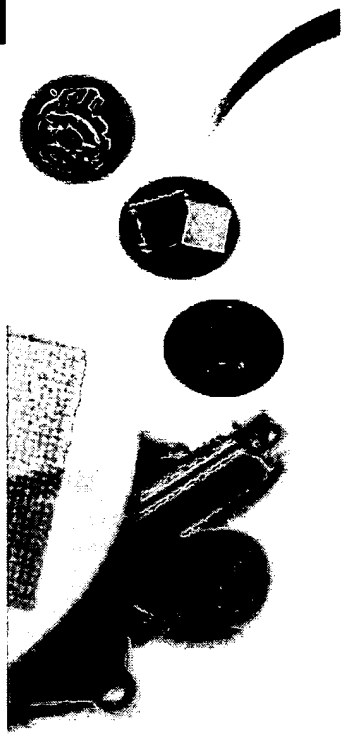


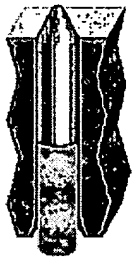
CIN::APSE PRODUCT OFFERINGS

CIN::APSE® is more than a connector; it's a versatile inter-connection t using our many different sizes of buttons, plungers and spacers we cai almost limitless number of configurations. This flexibility means that w

CIN::APSE® to meet your exact interconnect needs.

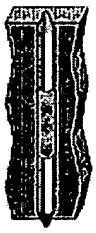
Button Only

This is the basic CIN::APSE® contact configuration suited for applications requiring minimum height, hi signal integrity. This configuration is used in LGA s



Plunger-Button

The addition of a gold plated brass plunger increas of the CIN::APSE® contact while also achieving ad This configuration is ideally suited for board-to-boai and those that require excessive handling.



Plunger-Button-Plunger

Adding a second plunger to the connector results ir durable and tallest system. This configuration is be both sides of the contact will see excessive handlin

Button-Spacer-Button

Using two buttons with a gold plated brass spacer i creates a connector with all the benefits of the butt but the ability to span greater z-axis heights. This c used where the button's multiple points of contact a

Connector Type	Mated Heigh
Button Only (.020" dia. button)	.032" to .050
Button Only (.040" dia. button)	.032" to .075
Plunger-Button	.078" to .50"
Plunger-Button-Plunger	.120" to 1.50
Button-Spacer-Button	.100" to 1.00

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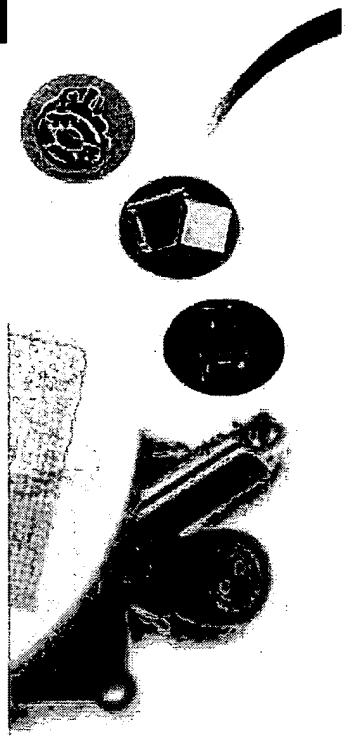

CIN::APSE

WHAT IS CIN::APSE?

CIN::APSE® is a solderless z-axis interconnect technology that offers e

mechanical and electrical performance. CIN::APSE® is a proven techno pedigree of providing reliable solutions to some of the most demandin

Custom made to meet your specific needs, CIN::APSE® utilizes a multi that can be as small as .8mm in height, comes in 1mm centers, and can frequencies greater than 20 GHz.

The key to this high performance technology is the CIN::APSE® button-conta contacts are made by randomly winding gold plated molybdenum or tungster cylindrical button. The buttons are then loaded(stitched) into a custom molde configured to the exact requirements of the application. Cinch's patented hou button-hole allows the button to float and, therefore, stay in contact even und Thermal Expansion(TCE) mismatch between mated substrates.

Unlike other z-axis technologies, such as elastomeric connectors, CIN::APSE a high modulus of elasticity which means they can be compressed thousand without taking a compression set. CIN::APSE® buttons are also very lightwei thermally stable which makes them extremely resistant to intermittent signals shock/vibration or thermal cycling.

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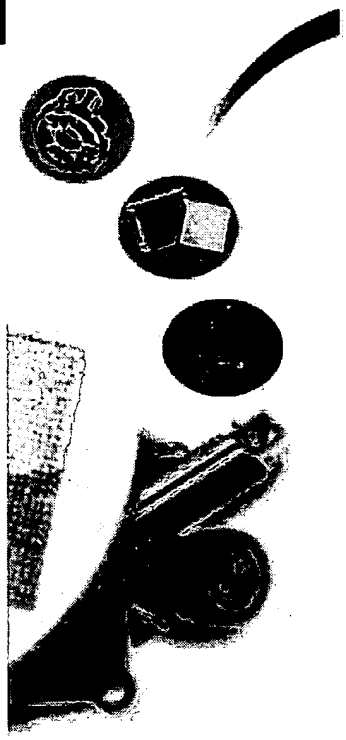

CIN::APSE MATERIALS

Materials

Contact Material: Molybdenum

CIN::APSE® Contact Plating: Gold
Plunger Material: Copper alloy
Plunger Plating: Gold
Insulator Material: Liquid crystal polymer
Packaging Tray Material: Anti-static ABS

Environmental

Button-Only Configuration with 0.020" (0.5 mm) diameter
Temperature Life Testing: 1000 Hours @ 200°C
Thermal Shock: 2000 Cycles @ -20°C to +85°C
Humidity: 5000 Hours @ 30°C to 80°C, 85% RH
Salt Spray: 96 Hours
Low Temperature: Operates in liquid nitrogen (77°K)
Bellcore TR-NWT-001217: Passed with plungers

Electrical

Button-Only Configuration with 0.020" (0.5 mm) diameter
DC Resistance: 15 milliohm average
Inductance: Less than 1 nH
Current-Carrying Capability: 1-3 Amps
Insulation Resistance: 25,000 Megohm @ 500 VDC
Dielectric Withstanding Voltage: 900 VAC at sea level

Mechanical

Button-Only Configuration with 0.020" (0.5 mm) diameter

Durability: 25,000 Z-axis actuations (CIN::APSE® contact only)
Shock: 100 Gs; 6 milliseconds, no discontinuity greater than 2 nanoseconds
Vibration: 20 Gs; 10-20,000 Hz; no discontinuity greater than 2 nanoseconds

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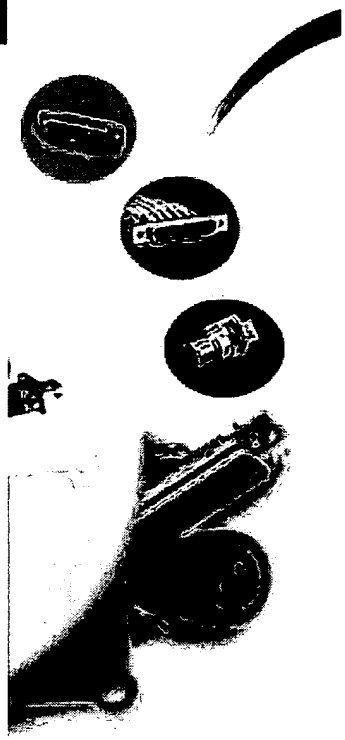

MICROMINIATURE INTRODUCTION

Cinch Microminiature™ connectors are designed for applications that r rugged, durable, and high-performance interconnect. Microminiature is connector for applications where weight and space must be kept to a m maintaining maximum reliability. Miniaturized airborne electronics and processing equipment, where shorter signal paths are needed, represei applications for these unique connectors.

The heart of the Microminiature system is the Microminiature pin contact. Th Microminiature pin contact is made from a precision miniature spring cable w The expanded cable provides seven spring members peripherally around the contact is maintained with the mating socket wall no matter what radial force: This spring may be flexed many times without any evidence of metal fatigue. is further ensured by protecting the pin contact in a tightly toleranced recesse

Cinch's family of Microminiature connectors includes MIL-C-83513 Series co with our own commercial equivalents. The commercial Microminiature produ expanded range of termination and hardware options for all-plastic and meta versions and right-angle and straight PC board mount "terminal blocks". Cinc packages the Microminiature contact in a very low profile plastic strip connec centers and in a line of high-density microminiature edge (Microedge) board meet the requirements of MIL-C-55302. Cinch has created a line of plastic ar Microminiature connector savers for very high mating cycle applications such equipment.

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Results Key:
JNL = Journal or Magazine **CNF** = Conference **STD** = Standard

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1 **WSI implemented with button board interconnection**
Arcos, J.T.; Kamiyama, W.T.; Swartzlander, E.E.; Young, W.E.;
Wafer Scale Integration, 1990. Proceedings., [2nd] International Conference on , 23-25 Jan. 1990
Pages:317 - 321

[Abstract] [PDF Full-Text (212 KB)] **IEEE CNF**

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2 **Assessing the operating reliability of land grid array elastomer sock**
Jingsong Xie; Hillman, C.; Sandborn, P.; Pecht, M.G.; Hassenzadeh, A.; DeDc D.;
Components and Packaging Technologies, IEEE Transactions on [see also Components, Packaging and Manufacturing Technology, Part A: Packaging Technologies, IEEE Transactions on] , Volume: 23 , Issue: 1 , March 2000
Pages:171 - 176

[Abstract] [PDF Full-Text (236 KB)] **IEEE JNL**

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3 **Solderless high-density interconnects for burn-in applications**
Guarin, F.J.; Katsetos, A.A.;
Electronic Components and Technology Conference, 1992. Proceedings., 42nc 20 May 1992
Pages:263 - 267

[Abstract] [PDF Full-Text (568 KB)] **IEEE CNF**

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4 **Button contacts for liquid nitrogen applications**
Almquist, F.;
Electronic Components Conference, 1989. Proceedings., 39th , 22-24 May 19
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[Abstract] [PDF Full-Text (392 KB)] IEEE CNF

5 **Contact resistance degradation in z-axis connectors operated at bu temperatures**
Guarin, F.J.; Longenbach, K.F.;
Electronic Components and Technology Conference, 1993. Proceedings., 43rd
June 1993
Pages:88 - 92

[Abstract] [PDF Full-Text (400 KB)] IEEE CNF

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